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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/749,986	12/31/2003	Donald S. Gardner	42P18458	9962

8791 7590 11/17/2005

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EXAMINER

DUPUIS, DEREK L

ART UNIT	PAPER NUMBER
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2883

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/749,986	GARDNER ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Derek L. Dupuis	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 August 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 32-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/31/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 8/31/2005 have been fully considered but they are not persuasive.
2. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the examiner has identified a motivation in the Chan et al reference. Chan et al suggests that nano-crystals provide a highly effective electroluminescent structure (see column 2, lines 43-55) when used in silicon dioxide (see column 3, line 59 to column 4, line 16). Armani et al also suggest that the silicon dioxide of the microresonator can include an added dopant or embedded active optical component (see paragraph 59). These suggestions would lead one of ordinary skill in the art to combine the teachings of Armani et al and Chan et al since Armani et al suggests adding a dopant or active optical element and since Chan et al suggests improved optical effects can be achieved by adding nano-crystals into an optical medium.
3. Applicant's arguments, see page 7, in combination with the amendments to the specification and the claims filed 8/31/2005, with respect to the objections to the specification and to claim 10 have been fully considered and are persuasive. The objections to the specification and to claim 10 have been withdrawn.

4. Claims 1-31 were cancelled by applicant. New claims 32-52 were added.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 32-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Armani et al (US 2004/0179573 A1)* and further in view of *Chan et al (US 6,236,060 B1)*.

7. Regarding claims 32-35, 40, 43-45, 47, 51, and 52, Armani et al teach an apparatus shown in figures 1, 4, 6, and 7. The apparatus includes a silicon substrate (120) (see paragraph 12). A microresonator (110) with an annular structure is disposed on the substrate (120) as shown in figure 1. The microresonator (110) is used to recirculate light at a desired wavelength (see paragraph 4). A waveguide (400) is disposed on the silicon substrate above the microresonator and light is coupled between the waveguide and the microresonator as shown in figures 4A and 4B (see paragraph 47). Armani et al show in figure 4D that the microresonator can be coupled between multiple waveguides (400). Armani et al also teach the use of an optical pump to excite circulation of light in the microresonator (see paragraph 50).

8. Armani et al do not explicitly teach that the microresonator comprises silicon dioxide with silicon or silicon germanium nanocrystals. Armani et al also do not teach that a pump tunnels current through the silicon dioxide to form electron-hole pairs in the nanocrystals. Chan et al teaches a light emitting device comprising electrically conductive materials. Chan et al teaches that it is well known to inject silicon nanocrystals or silicon-germanium nanocrystals into

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a layer of silicon dioxide (see column 3, line 59 to column 4, line 16 of Chan et al). Chan et al teach that it is also well known in the art to tunnel current from a source to create electron-hole pairs in nanocrystals (see column 2, lines 43-55).

9. Regarding claims 36-39, 48, and 49, Armani et al teach an apparatus as discussed above in reference to claims 11 and 24, respectively. Armani et al teach that the annular structure can be a ring or a disk (see paragraph 26). Armani et al teach that the optical energy within the microresonator can be resonant in a whispering gallery mode (WGM) (see paragraph 12). By definition, a microresonator where the energy is resonant in a WGM is inherently has a circumference that is an integer multiple of the wavelength of the optical signal. The length from the center of the disk to the center of the waveguide forming the disk is, by definition, the radius of the disk. Therefore, radius of the disk is proportional (by  $2\pi$ ) to the circumference which is an integer multiple of the wavelength of the optical signals being resonated in the microresonator. By definition, a disc structured microresonator where the energy is resonant in a WGM inherently has a perimeter that is an integer multiple of the wavelength of the optical signal.

10. Regarding claims 41, 42, and 50, Armani et al teach an apparatus as discussed above in reference to claims 11 and 24, respectively. Armani et al teach that the microresonator comprises a rare earth, specifically, erbium or ytterbium (see paragraph 14).

11. Regarding claim 46, Armani et al teach an apparatus as discussed above in reference to claim 24. Armani et al teach that the distance between the waveguide and the microresonator is "in the order of hundreds of nanometers". This range includes the claimed range of being less than or equal to 250 nm. In the case where the claimed ranges "overlap or lie inside ranges

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disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05.

12. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the micro-resonator of Armani et al by injecting silicon or silicon-germanium nanocrystals into a layer of silicon-dioxide and tunneling current through the layer to form electron-hole pairs in the nanocrystals as taught by Chan et al. Motivation to do this would be to result in a "high efficiency electroluminescent structure" (see column 2, lines 50-55 of Chan et al). Armani et al also suggest that the silicon dioxide of the microresonator can include an added dopant or embedded active optical component (see paragraph 59). These suggestions would lead one of ordinary skill in the art to combine the teachings of Armani et al and Chan et al since Armani et al suggests adding a dopant or active optical element and since Chan et al suggests improved optical effects can be achieved by adding nano-crystals into an optical medium. Furthermore, additional motivation would be that it is common practice in the art to channel current through an oxide layer to form electron-hole pairs to excite energy.

### ***Double Patenting***

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. Claims 32-34, 36-46, and 48-52 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 11/121580 (US 2005/0226564). Although the conflicting claims are not identical, they are not patentably distinct from each other because all of the limitations in the claims of the instant application are taught in the various embodiments of the 11/121580 application. It would have been obvious to one of ordinary skill in the art at the time of invention to combine the various limitations since the specification of the application teaches such combinations.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### *Conclusion*

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek L. Dupuis whose telephone number is (571) 272-3101.

The examiner can normally be reached on Monday - Friday 8:30am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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